

CLAIMS

1. A composition comprising a palladium compound, an isocyanide represented by the formula (I)



wherein R^1 , R^2 and R^3 are the same or different and each is an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted aryl group or an optionally substituted aralkyl group, or two
10 of them optionally form a cycloalkyl group together with a carbon atom bonded thereto,
and a base represented by the formula (II)



wherein M is an alkali metal, an alkaline earth metal or
15 an onium, R^4 is a hydrogen atom, an optionally substituted alkyl group, an optionally substituted alkenyl group, an optionally substituted aryl group or an optionally substituted aralkyl group, when M is an alkali metal or an onium, then n is 1, and when M is an alkaline earth metal,
20 then n is 2.

2. The composition of claim 1, wherein the palladium compound is a divalent palladium salt.

25 3. The composition of claim 1, wherein the isocyanide is selected from t-butylisocyanide, 1,1-dimethylpropylisocyanide and 1,1,3,3-tetramethylbutylisocyanide.

30 4. The composition of claim 1, wherein the composition ratio of the isocyanide is within the range of 0.1 - 50 equivalents relative to the palladium compound.

5. The composition of claim 4, wherein the composition

ratio of the isocyanide is within the range of 1 - 20 equivalents relative to the palladium compound.

6. The composition of claim 1, wherein the base is
5 selected from lithium hydroxide, lithium methoxide, sodium hydroxide, sodium methoxide, sodium isopropoxide, sodium s-butoxide, sodium phenoxide, sodium benzyloxide, potassium hydroxide, potassium methoxide, potassium ethoxide, potassium isopropoxide, potassium s-butoxide,
10 potassium t-butoxide, potassium phenoxide, potassium benzyloxide, rubidium hydroxide, cesium hydroxide, calcium hydroxide, strontium hydroxide, barium hydroxide, tetramethylammonium hydroxide, tetramethylammonium methoxide, tetramethylammonium phenoxide,
15 tetramethylammonium benzyloxide, tetrabutylammonium hydroxide, benzyltrimethylammonium hydroxide, trimethylsulfonium hydroxide, tetraphenylphosphonium hydroxide and trimethyloxonium hydroxide.
- 20 7. The composition of claim 1, wherein the composition ratio of the base is within the range of 0.1-100000 equivalents relative to the palladium compound.
- 25 8. The composition of claim 7, wherein the composition ratio of the base is within the range of 1-10000 equivalents relative to the palladium compound.
- 30 9. A method of producing ethers, which comprises subjecting a conjugated diene compound and an alcohol to a telomerization reaction in the presence of the composition of claim 1 as a catalyst to give an ether.
10. The production method of claim 9, wherein the alcohol is represented by the formula (VII)

$R^{19}OH$ (V I I)

wherein R^{19} is an alkyl group optionally having substituents, an alkenyl group optionally having substituents, an aryl group optionally having substituents⁵ or an aralkyl group optionally having substituents.

11. The production method of claim 9, wherein the alcohol is selected from methanol, ethanol, 1-propanol, 2-propanol, 2-methyl-1-propanol, 1-butanol, 2-butanol,
¹⁰ pentanol, isoamyl alcohol, cyclopentanol, hexanol, 2-hexanol, cyclohexanol, heptanol, octanol, 2-octanol, 3-octanol, benzyl alcohol, phenethyl alcohol, phenol, ethylene glycol, diethylene glycol, propylene glycol, ethylene glycol monomethyl ether, ethylene glycol
¹⁵ monoethyl ether, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, propylene glycol monomethyl ether and propylene glycol monoethyl ether.
12. The production method of claim 9, wherein the amount
²⁰ of the alcohol to be used is within the range of 0.1 - 10 equivalents per the conjugated diene compound.
13. The production method of claim 12, wherein the amount of the alcohol to be used is within the range of 0.5-5
²⁵ equivalents per the conjugated diene compound.
14. The production method of claim 9, wherein the palladium compound is a divalent palladium salt.
- ³⁰ 15. The production method of claim 9, wherein the amount of the palladium compound to be used is within the range of 0.0000001-0.00002 equivalent per the conjugated diene compound.

16. The production method of claim 15, wherein the amount of the palladium compound to be used is within the range of 0.000001-0.00002 equivalent per the conjugated diene compound.

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17. The production method of claim 9, wherein the amount of the isocyanide to be used is within the range of 0.1-50 equivalents per the palladium compound.

¹⁰ 18. The production method of claim 17, wherein the amount of the isocyanide to be used is within the range of 1-20 equivalents per the palladium compound.

¹⁵ 19. The production method of claim 9, wherein the amount of the base to be used is within the range of 0.1-100000 equivalents per the palladium compound.

20. The production method of claim 19, wherein the amount of the base to be used is within the range of .1-10000 equivalents per the palladium compound.

21. The production method of claim 9, wherein the reaction temperature of the telomerization reaction is within the range of 0°C - 150°C.

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22. The production method of claim 21, wherein the reaction temperature of the telomerization reaction is within the range of 20°C - 110°C.